



May 21, 2009

Ms. Mary Adams
Central Coast Regional Water Quality Control Board
895 Aerovista Place, Suite 101
San Luis Obispo 93401

**Subject: Proposed Revisions to the 303(d) List of Impaired Water Bodies and
Consideration of an Integrated Assessment Report for the Central Coast Region**

Dear Ms. Adams,

We would like to thank you and the Central Coast Regional Water Quality Control Board (CCRWQCB) for an opportunity to comment on the most recent listings of impaired water bodies. As a research institution that has been collecting water quality data for the last 20 years in Elkhorn Slough, we would like to suggest and support certain listings to the Central Coast's 303(d) list that pertain to Elkhorn Slough and adjacent waters. Our recommendations are based both on our extensive, rigorous water quality monitoring data and on our ecological investigations of how the rich biological communities of these waters are impacted by poor water quality.

The poor water quality in Elkhorn Slough has produced highly eutrophic conditions that must be having highly significant impacts on plant and animal abundance and distribution in the estuary, based on extensive investigations from other estuaries on how communities respond to nutrient loading, algal growth and hypoxia. The negative consequences of eutrophication in estuarine environments causes much concern because it can increase primary productivity, which leads to increases in benthic oxygen demand, and therefore causing diel crashes in dissolved oxygen. This crash in dissolved oxygen has deleterious effects to species, such as crabs, oysters, clams, sharks, rays, and bottom fish, which have a high dissolved oxygen threshold. Crashes in dissolved oxygen can also lead to trophic collapses because habitat of prey items such as clams and worms becomes limited due to hypoxic conditions. Eelgrass beds, known to serve an important nursery function for commercially valuable flatfish, have been shown to be sensitive to nutrient-loading and subsequent macroalgal growth. In summary, the effects of nutrient-loading and eutrophication in estuaries and very well understood for estuaries, and have been illustrated in hundreds of scientific publications. Elkhorn Slough area waters have nutrient concentrations higher than virtually any other estuary that has been studied in the world, so threats from eutrophication are very grave.



*The Elkhorn Slough National Estuarine Research Reserve is managed by the California Department of Fish and Game
in cooperation with the National Oceanic and Atmospheric Administration*



Elkhorn Slough hosts many human uses dependent on estuarine ecosystem health: fishing, clam-harvesting, birdwatching, kayaking, hiking, etc. Rigorous studies have shown that flatfish that use Elkhorn Slough as a nursery contribute disproportionately to commercial catch of flatfish in the Monterey Bay. Elkhorn Slough has the largest salt marsh on the central coast, and the only native oyster population between Mugu Lagoon and San Francisco Bay. Sea otters and harbor seals pup there, and it has been recognized as a globally important migratory shorebird stopover. The adjacent water bodies also have high ecological and human value. Moss Landing Harbor hosts up to a hundred sea otters, providing refuge and food for a significant proportion of the recovering population. The harbor area also has the highest density of large clams (gapers, butter clams) and ghost shrimp in the estuary. Moro Cojo and Bennett Sloughs provide habitat for threatened brackish water species, the *Tryonia* snail and tidewater gobies, as well as, at their upper margins, for threatened freshwater species including Santa Cruz Long-toed Salamanders. Historical records from a century ago document that Tembladero Slough and the Old Salinas River channel also used to harbor rich estuarine communities, including salmon, native oysters, and large clams that were harvested. The water in these channels is now too polluted to sustain such communities, but if water quality improved, restoration could occur. Moreover, Tembladero Slough and Old Salinas River water quality is critical to regulate because it directly impacts water quality of the Moss Landing Harbor (i.e. where hundreds of sea otters live) and Elkhorn Slough.

Attached with this letter is a summary of some of the water quality data that has been collected by scientists at the Elkhorn Slough National Estuarine Research Reserve (ESNERR). These data support our recommendations for impaired water body listings. ESNERR can also provide additional data in the future to assist in the TMDL process. The data collected by ESNERR is of high quality and, as of 2006, a QAPP has been approved by the CCRWQCB for the monthly data that form the main basis of our suggested listings. We also participate in an equally rigorous and highly regulated water monitoring program, the National Estuarine Research Reserve System-wide Monitoring Program, collecting water quality data at four in-situ sondes every 15 minutes and sending the data to a national archive. We refer to some of these data as well as the monthly data to make our case.

Given the high number of proposed TMDLs for the latest revisions, we are limiting our suggestions and recommendations to **Nutrients** and **Low Dissolved Oxygen** for Elkhorn Slough and its adjacent water bodies. The limited recommendations accomplishes two tasks. First, it reduces that amount of TMDLs that need to be supported by CCRWQCB during this time of limited resources. Second, it focuses on the two end members of eutrophication problems in Elkhorn Slough: high nutrients and low dissolved oxygen. Our emphasis on these parameters is because we have extremely rigorous and extensive data showing ecologically alarming levels of high nutrients and low oxygen that provides robust support for these listings and this approach. We do not rule out that equally troubling problems pertain to fecal coliform bacteria or pesticides, but we do not have the data at hand ourselves to comment on these issues.

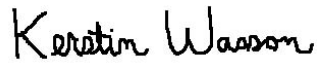
The data presented in the following pages clearly demonstrate that sites within each of the regions (Bennett Slough, Carneros Creek, Elkhorn Slough, Moro Cojo Slough, Moss Landing Harbor, Old Salinas River, Tembladero Slough) frequently exceed recommended levels for nutrients and duration of hypoxia. Since these water bodies are all interconnected, it would be wise to take an integrated approach to managing for nutrient-loading and subsequent dissolved oxygen problems in these contiguous areas.

- We support the proposed TMDL listings for **low dissolved oxygen** in Bennett Slough, Carneros Creek, Elkhorn Slough, Moro Cojo Slough, Moss Landing Harbor, Old Salinas River, and Tembladero Slough.
- We support the TMDL listing of **nitrate** in Tembladero Slough. We recommend a TMDL listing for **nitrate** in Bennett Slough, Carneros Creek, Elkhorn Slough, Moro Cojo Slough, Moss Landing Harbor, and Old Salinas River.
- We recommend a TMDL listing for **phosphate** in Bennett Slough, Carneros Creek, Elkhorn Slough, Moro Cojo Slough, Moss Landing Harbor, Old Salinas River, and Tembladero Slough.
- We recommend a TMDL listing for **ammonia** in Bennett Slough, Elkhorn Slough, and Moss Landing Harbor. We oppose the TMDL delisting of **ammonia** for Tembladero Slough.

Of all of these listings, those of highest priority from our perspective as estuarine conservation scientists with expertise in water quality and estuarine ecology, are the ones for nitrate and dissolved oxygen in Elkhorn Slough, the least degraded and most biologically rich remnant of what once functioned as one interconnected estuarine system. This one arm of the estuary which once had five interconnected arms is now the last refuge for extremely rare estuarine habitats and species, and so deserves the highest level of regulatory focus and prioritization.

If your staff needs any additional information please encourage them to contact Brent Hughes, ESNERR Estuarine Ecologist, at brent@elkhornslough.org or at the phone or address listed on top of the letterhead.

Sincerely,



Kerstin Wasson, Ph.D.
ESNERR Research Coordinator



John C. Haskins
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Brent Hughes
ESNERR Estuarine Ecologist